

REMARKS

Claims 1 through 12 remain in the application. A marked up copy of the amended paragraph of the specification is attached hereto as Appendix A.

The disclosure was objected to because of an informality on page 6, line 8.

Accordingly, the specification has been amended on page 6, line 8, to change reference number "38" to "40". It is respectfully submitted that the specification, as amended, overcomes the objection.

Claims 1, 4, 5, 8, and 10 through 12 were rejected under 35 U.S.C. § 103 as being unpatentable over Tong et al. (U.S. Patent No. 6,226,568). Applicants respectfully traverse this rejection.

U.S. Patent No. 6,226,568 to Tong et al. discloses a method of balancing paint booth air flows. Low air flows sensors 52 may be used adjacent each cross-flow damper 50, the sensor providing accuracy in signaling air flow direction and air flow velocity. Digital output of the sensors is sent to a microprocessor 53 which in turn converts the information for use by a programmable logic controller that adjusts the cross-flow dampers and venturi gap width. An operator interface with the controller can be attained through use of a desktop terminal personal computer 55 or through a remote terminal unit. Tong et al. does not disclose a portable airflow sensor to measure airflows in the paint booth and a portable computer connected to the airflow sensor for collecting data from the airflow sensor.

In contradistinction, claim 1 claims the present invention as a portable advisory system for balancing airflows in a paint booth including a portable airflow sensor to measure airflows in the paint booth. The portable advisory system also includes a portable computer connected to the airflow sensor for collecting data from the airflow sensor and guiding an

operator through a process of adjusting multiple fan speeds and duct dampers to achieve desired airflows.

The United States Court of Appeals for the Federal Circuit (CAFC) has stated in determining the propriety of a rejection under 35 U.S.C. § 103, it is well settled that the obviousness of an invention cannot be established by combining the teachings of the prior art absent some teaching, suggestion or incentive supporting the combination. See In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 U.S.P.Q. 657 (Fed. Cir. 1985); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 221 U.S.P.Q. 929 (Fed. Cir. 1984). The law followed by our court of review and the Board of Patent Appeals and Interferences is that “[a] prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art.” In re Rinehart, 531 F.2d 1048, 1051, 189 U.S.P.Q. 143, 147 (C.C.P.A. 1976). See also In re Lalu, 747 F.2d 703, 705, 223 U.S.P.Q. 1257, 1258 (Fed. Cir. 1984) (“In determining whether a case of prima facie obviousness exists, it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification.”)

Tong et al. ‘568, either alone or modified, does not teach or suggest the claimed invention of claim 1. Specifically, Tong et al. ‘568 merely discloses a method of balancing paint booth air flows in which a digital output of air flows sensors is sent to a microprocessor which converts the information for use by a programmable logic controller with an operator interface through use of a desktop terminal personal computer or through a remote terminal unit. Tong et al. ‘568 lacks a portable airflow sensor to measure airflows in the paint booth and a portable computer connected to the airflow sensor for collecting data from the airflow sensor. In Tong et

al. '568, the air flow sensors 52 are permanently mounted and not portable. Also, Tong et al. '568 uses on-line control via a desktop computer 55, which is not a portable computer. The reference, if modifiable, fails to teach or suggest the combination of a portable advisory system for balancing air flows in a paint booth including a portable airflow sensor to measure airflows in the paint booth and a portable computer connected to the airflow sensor for collecting data from the airflow sensor as claimed by Applicants. The claimed invention is novel and unobvious because the portable advisory system uses a handheld acoustic anemometer or airflow sensor to measure airflows in a paint booth that are output to a laptop/palmtop computer that collects data and guides the operator through the process of adjusting multiple fan speeds and duct dampers to achieve the desired airflows in the paint booth in a relatively short time interval without adding costly automation equipment. Therefore, it is respectfully submitted that claim 1 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 103.

As to claim 8, claim 8 claims the present invention as a method of balancing airflows in a paint booth. The method includes the steps of providing a portable airflow sensor to measure airflows in the paint booth and providing a portable computer and connecting the portable computer to the air flow sensor. The method also includes the steps of measuring the velocity of the airflows in the paint booth with the airflow sensor and storing the measured airflows in a database and updating a sensitivity model (J) of the paint booth with the measured velocity of the airflows to balance the airflows in the paint booth.

Tong et al. '568, either alone or modified, does not teach or suggest the claimed invention of claim 8. Specifically, Tong et al. '568 merely discloses a method of balancing paint booth air flows in which a digital output of air flows sensors is sent to a microprocessor which converts the information for use by a programmable logic controller with an operator interface through use of a desktop terminal personal computer or through a remote terminal unit. Tong et

al. '568 lacks providing a portable airflow sensor to measure airflows in the paint booth and providing a portable computer and connecting the portable computer to the airflow sensor. Tong et al. '568 also lacks measuring the velocity of the airflows in the paint booth with the airflow sensor and storing the measured airflows in a database and updating a sensitivity model (J) of the paint booth with the measured velocity of the airflows to balance the airflows in the paint booth. In Tong et al. '568, the air flow sensors 52 are permanently mounted and not portable. Also, Tong et al. '568 uses on-line control via a desktop computer 55, which is not a portable computer. The reference, if modifiable, fails to teach or suggest the combination of a method of balancing airflows in a paint booth including the steps of providing a portable airflow sensor to measure airflows in the paint booth, providing a portable computer, connecting the portable computer to the air flow sensor, measuring the velocity of the airflows in the paint booth with the airflow sensor, storing the measured airflows in a database, updating a sensitivity model (J) of the paint booth with the measured velocity of the airflows to balance the airflows in the paint booth as claimed by Applicants. The claimed invention is novel and unobvious because the method automatically updates a simplified model of the airflows in a paint booth and uses this model to iteratively calculate the optimum adjustments to the fan speed and/or duct damper settings by minimizing the mean squared error between current and target airflows. Therefore, it is respectfully submitted that claim 8 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 103.

Claims 6 and 7 were rejected under 35 U.S.C. § 103 as being unpatentable over Tong et al. '568 and further in view of Rein et al. (U.S. Patent No. 5,341,988). Applicants respectfully traverse this rejection for the same reasons given above to claim 1.

Claims 1 through 3, 8, and 9 were rejected under 35 U.S.C. § 103 as being unpatentable over Tong et al. (U.S. Patent No. 6,146,264). Applicants respectfully traverse this rejection.

U.S. Patent No. 6,146,264 to Tong et al. discloses a paint booth air flow control system. Fans and dampers are controlled by flow velocity sensors 60 located at partitions 26. A computer 88 includes a co-processor 76 containing an algorithm that is designed to drive the fans and dampers toward a desired operating mode represented by arrows 52. The computer 88 further includes a programmable logic controller 78 that receives signals from the sensors 60 and delivers control signals to fan motors and damper motors. Tong et al. does not disclose a portable airflow sensor to measure airflows in the paint booth and a portable computer connected to the airflow sensor for collecting data from the airflow sensor.

In contradistinction, claim 1 claims the present invention as a portable advisory system for balancing airflows in a paint booth including a portable airflow sensor to measure airflows in the paint booth. The portable advisory system also includes a portable computer connected to the airflow sensor for collecting data from the airflow sensor and guiding an operator through a process of adjusting multiple fan speeds and duct dampers to achieve desired airflows.

Tong et al. '264, either alone or modified, does not teach or suggest the claimed invention of claim 1. Specifically, Tong et al. '264 merely discloses a paint booth air flow control system in which a computer includes a programmable logic controller that receives signals from flow velocity sensors and delivers control signals to fan motors and damper motors. Tong et al. '264 lacks a portable airflow sensor to measure airflows in the paint booth and a portable computer connected to the airflow sensor for collecting data from the airflow sensor. In Tong et al. '264, the sensors 60 are permanently mounted and not portable. Also, Tong et al.

'264 uses on-line control via the co-processor 76, which is not a portable computer. The reference, if modifiable, fails to teach or suggest the combination of a portable advisory system for balancing air flows in a paint booth including a portable airflow sensor to measure airflows in the paint booth and a portable computer connected to the airflow sensor for collecting data from the airflow sensor as claimed by Applicants. The claimed invention is novel and unobvious because the portable advisory system uses a handheld acoustic anemometer or airflow sensor to measure airflows in a paint booth that are output to a laptop/palmtop computer that collects data and guides the operator through the process of adjusting multiple fan speeds and duct dampers to achieve the desired airflows in the paint booth in a relatively short time interval without adding costly automation equipment. Therefore, it is respectfully submitted that claim 1 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 103.

As to claim 8, claim 8 claims the present invention as a method of balancing airflows in a paint booth. The method includes the steps of providing a portable airflow sensor to measure airflows in the paint booth and providing a portable computer and connecting the portable computer to the air flow sensor. The method also includes the steps of measuring the velocity of the airflows in the paint booth with the airflow sensor and storing the measured airflows in a database and updating a sensitivity model (J) of the paint booth with the measured velocity of the airflows to balance the airflows in the paint booth.

Tong et al. '264, either alone or modified, does not teach or suggest the claimed invention of claim 8. Specifically, Tong et al. '264 merely discloses a paint booth air flow control system in which a computer includes a programmable logic controller that receives signals from flow velocity sensors and delivers control signals to fan motors and damper motors. Tong et al. '264 lacks providing a portable airflow sensor to measure airflows in the paint booth and providing a portable computer and connecting the portable computer to the airflow sensor.

Tong et al. '264 also lacks measuring the velocity of the airflows in the paint booth with the airflow sensor and storing the measured airflows in a database and updating a sensitivity model (J) of the paint booth with the measured velocity of the airflows to balance the airflows in the paint booth. In Tong et al. '264, the sensors 60 are permanently mounted and not portable. Also, Tong et al. '264 uses on-line control via the co-processor 76, which is not a portable computer. The reference, if modifiable, fails to teach or suggest the combination of a method of balancing airflows in a paint booth including the steps of providing a portable airflow sensor to measure airflows in the paint booth, providing a portable computer, connecting the portable computer to the air flow sensor, measuring the velocity of the airflows in the paint booth with the airflow sensor, storing the measured airflows in a database, updating a sensitivity model (J) of the paint booth with the measured velocity of the airflows to balance the airflows in the paint booth as claimed by Applicants. The claimed invention is novel and unobvious because the method automatically updates a simplified model of the airflows in a paint booth and uses this model to iteratively calculate the optimum adjustments to the fan speed and/or duct damper settings by minimizing the mean squared error between current and target airflows. Therefore, it is respectfully submitted that claim 8 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 103.

Claims 6 and 7 were rejected under 35 U.S.C. § 103 as being unpatentable over Tong et al. '264 and further in view of Rein et al. '988. Applicants respectfully traverse this rejection for the same reasons given above to claim 1.

Claim 1 was rejected under 35 U.S.C. § 103 as being unpatentable over Ayer (U.S. Patent No. 5,643,077). Applicants respectfully traverse this rejection.

U.S. Patent No. 5,643,077 to Ayer discloses a continually optimize, variable flow rate ventilation system. A monitor 19 measures concentrations in a recirculation duct 16

upstream of where a fresh make-up air 17 is introduced and continuously analyzes the concentration in a recirculation stream 20. The output from the monitor 19 is sent to a central computer 22 via electrical interface, fiber optic cable, or equivalent 21. The central computer 22 controls the recirculation flow rate via a fresh make-up air intake damper 23 and a recirculation damper 24. Ayer '077 does not disclose a portable airflow sensor to measure airflows in the paint booth and a portable computer connected to the airflow sensor for collecting data from the airflow sensor.

In contradistinction, claim 1 claims the present invention as a portable advisory system for balancing airflows in a paint booth including a portable airflow sensor to measure airflows in the paint booth. The portable advisory system also includes a portable computer connected to the airflow sensor for collecting data from the airflow sensor and guiding an operator through a process of adjusting multiple fan speeds and duct dampers to achieve desired airflows.

Ayer '077, either alone or modified, does not teach or suggest the claimed invention of claim 1. Specifically, Ayer '077 merely discloses a continually optimize, variable flow rate ventilation system in which a monitor measures concentrations in a recirculation duct and the output from the monitor is sent to a central computer via electrical interface, fiber optic cable, or equivalent, which controls the recirculation flow rate via dampers. Ayer '077 lacks a portable airflow sensor to measure airflows in the paint booth and a portable computer connected to the airflow sensor for collecting data from the airflow sensor. Ayer '077 uses on-line control via a central computer 22, which is not a portable computer. The reference, if modifiable, fails to teach or suggest the combination of a portable advisory system for balancing air flows in a paint booth including a portable airflow sensor to measure airflows in the paint booth and a portable computer connected to the airflow sensor for collecting data from the airflow sensor as claimed

by Applicants. The claimed invention is novel and unobvious because the portable advisory system uses a handheld acoustic anemometer or airflow sensor to measure airflows in a paint booth that are output to a laptop/palmtop computer that collects data and guides the operator through the process of adjusting multiple fan speeds and duct dampers to achieve the desired airflows in the paint booth in a relatively short time interval without adding costly automation equipment. Therefore, it is respectfully submitted that claim 1 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 103.

Obviousness under § 103 is a legal conclusion based on factual evidence (In re Fine, 837 F.2d 1071, 1073, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988), and the subjective opinion of the Examiner as to what is or is not obvious, without evidence in support thereof, does not suffice. Since the Examiner has not provided a sufficient factual basis, which is supportive of his/her position (see In re Warner, 379 F.2d 1011, 1017, 154 U.S.P.Q. 173, 178 (C.C.P.A. 1967), cert. denied, 389 U.S. 1057 (1968)), the rejections of claims 1 through 12 are improper. Therefore, it is respectfully submitted that claims 1 through 12 are allowable over the rejections under 35 U.S.C. § 103.

Based on the above, it is respectfully submitted that the claims are in a condition for allowance, which allowance is solicited.

Respectfully submitted,

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Date: January 27, 2002
Attorney Docket No.: 0693.00196
Ford Disclosure No.: 199-0287

APPENDIX A**VERSION OF THE SPECIFICATION WITH MARKINGS TO SHOW THE
CHANGES**

Please amend the specification on page 6, lines 3 through 12 as follows:

The paint booth 10 includes a clearcoat bells zone 40 adjacent the flash-off zone 38. The paint booth 10 also includes a fourth air system handler 42 for handling airflow into the clearcoat bells zone 40. The paint booth 10 also includes a flash-off zone 44 adjacent the clearcoat bells zone [38] 40. It should be appreciated that the flash-off zone 44 allows paint to settle on the vehicle. It should further be appreciated that the air system handler 42 has fans mounted on a roof of the paint booth 10 that blow air from the ceiling to the floor of the zones as known in the art.